THERMOGRAPHY



Infrared Thermography (IRT)

- Electrical Maintenance Excellence
- Pharmaceutical Industry

Training Objectives

- Infrared Thermography [illegible] [illegible] [illegible] [illegible]
- Electrical faults advance [illegible] [illegible]
- Breakdown, Fire & Accident [illegible]

Why This Training?

- Pharma plant = High safety risk
- Electrical fire = Major loss
- Breakdown = Production loss
- Thermography = Preventive Solution

What is Infrared Thermography?

- 1800 Sir William Herschel
- Contact □□□ temperature measure □□□□□□ technique
- Infrared radiation detect □□□
- Thermal camera □□□□□□ visible image □□□
- Reduced Unplanned Downtime

Example

- □□□□□ wire touch □□□ □□□ □□ □□ □□□□ □□□ □ □□□
- Thermal camera □□ heat spot □□□□□
- Problem before failure identify

Infrared Radiation Basics

- Every object emits heat
- Temperature □□□ = Infrared emission □□□
- Camera □ radiation capture □□□

Thermography ***vs*** Normal Inspection

Normal Inspection	***Thermography Inspection***
Visual only	Heat based
Shutdown required	No shutdown
Late detection	Early detection

Why Thermography in Electrical?

- Loose connection
- Overloading
- Insulation failure

Electrical Fire – Root Cause

- Loose terminals
- Poor crimping
- Oxidation
- Overcurrent

All create heat → Fire risk

Thermography = Preventive Maintenance

- Breakdown □□□□□ warning
- Planned maintenance
- Zero surprise failure
- <u>**Continuous Production**</u>

Types of Thermal Cameras

- Handheld
- Fixed Mounted
- Smartphone Attachment

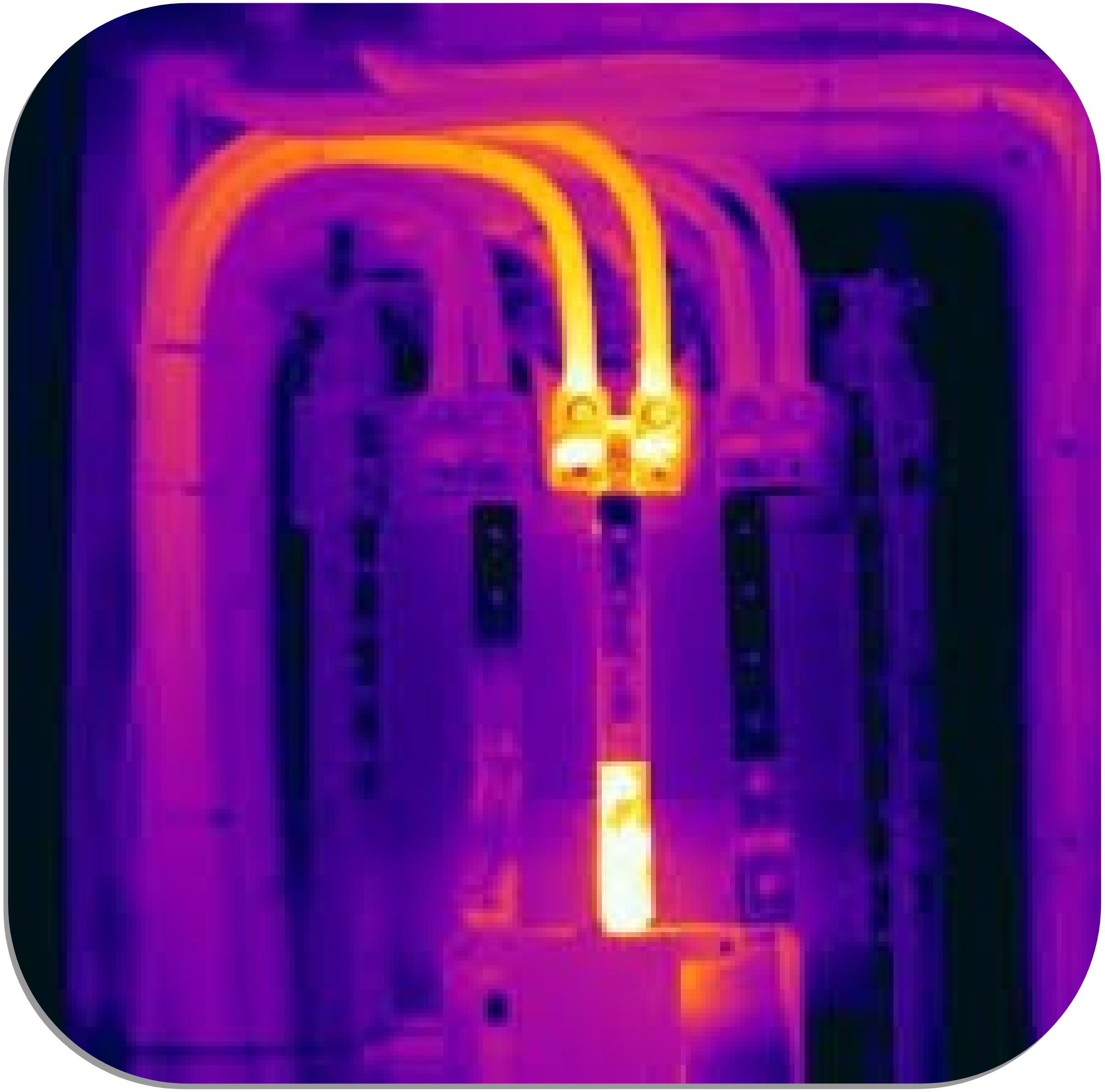






Thermal Image Colors

- White/Yellow = High Temperature
- Red = Hot
- Green = Normal
- Blue = Cold



Understanding Thermal Image

- Compare similar components
- Same load, different temperature = problem
- Relative comparison important

Safety Before Thermography

- PPE mandatory
- Electrical clearance
- Distance maintain
- No direct contact

Electrical Panels to Inspect

- LT Panel
- MCC Panel
- PCC Panel
- VFD Panel

Common Hotspots in Panels

- Incoming terminals
- Busbar joints
- MCCB / ACB contacts
- Cable lugs

Transformer Thermography

- HV & LV bushings
- Oil temperature pattern
- Load imbalance detection

Motor & Drive Inspection

- Motor terminals
- Bearings (overheating)
- VFD power modules

Cable & Tray Inspection

- Cable joints
- Overload cables
- Uneven heating pattern

Phase Imbalance Detection

- One phase hotter than others
- Indicates load imbalance
- Early corrective action

Thermography Inspection Frequency

- Critical panels – Monthly
- Normal panels – Quarterly
- After major modification – Mandatory

Documentation Importance

- Thermal image record
- Temperature reading
- Location & date
- Action taken

Reporting Format

- Equipment name
- Observed temperature
- Severity level
- Recommendation

Severity Classification

- Normal (<10°C)
- Warning (10–20°C)
- Critical (>20°C)
- Major (>40°C)

Real Case Study

- MCC panel terminal @ 95°C
- Immediate tightening done
- Fire accident avoided

Do’s in Thermography

- □ Compare similar points
- □ Record baseline image
- □ Inspect under load
- □ Use trained person

Don’ts in Thermography

- □ Inspect without PPE
- □ Ignore minor hotspots
- □ Compare different load equipment
- □ Delay corrective action

Benefits to Organization

- Zero electrical fire
- Reduced breakdown
- Longer equipment life
- GMP & Audit ready


Conclusion
Infrared Thermography
= Safety + Reliability + Productivity
"Heat speaks before failure – Learn to listen."
Key Takeaways:
Early Fault Detection
Improved Safety
Higher Reliability
Cost Saving
Smart Maintenance Tool
Final Message:
"Infrared Thermography is not an option,
it is a necessity for modern, safe & reliable industries."